Profitable Irrigation Crops

AN ADDRESS

By

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Mr. Chairman, Ladies and Gentlemen:—

I wish to state in starting the discussion of this subject that there is no question but that it should be the first business of every farmer, either irrigation or otherwise, to deplete the fertility of his soil as rapidly as possible by producing maximum crops. Some of you may not have looked at the business of farming in this light, but this is certainly the proper viewpoint. Of course the farmer cannot produce maximum crops year after year without using care to replace the fertility of his soil in some way, any more than can a grocer continue to sell supplies indefinitely without replacing his stock.

Fertility to start with is more or less of a fixed factor. When the original soils were laid down in this part of the country millions of years ago, each particular type contained a certain definite amount of plant food. When this is used up the soil's fertility is exhausted and its crop producing power is gone. The original elements of plant food contained in the soil when they were formed were mostly of a mineral nature. It should be understood that plants cannot use any plant food that is not soluble, as practically all plant food is taken up by plants in solution in the water absorbed by the plant roots. In humid districts where it has been raining for perhaps millions of years, these rains have leached out a large part of the soluble plant food that is still available for the use of plants in our arid and semi-arid districts. In these same humid districts however, there has always been something growing up and dying down each year which has added a large amount of vegetable or nitrogenous plant food to the soils. The weather conditions of the arid districts have been such that they have neither grown the vegetation nor leached out the mineral plant foods. The present soil of these districts, are therefore, vastly different from those formed in the humid ones. The humid districts have soils poor in mineral plant foods and rich in vegetable matter, while the soils of the arid districts are just the reverse. You may not have thought of it in this light, but the soils of the arid districts are more to be preferred for their deficiency in nitrogen can be supplied much more easily and cheaply than can be the deficiency of the mineral plant foods of humid soils, which can only be replenished through the addition of expensive commercial fertilizers.

All legumes, which are plants that bear their seeds in a pod, such as alfalfa, clover, field peas, vetch and beans, rapidly replenish and add nitrogen to any soil upon which they are grown through the bacteria that are always harbored on their roots. These bacteria live and thrive upon legume roots

and fortunately have the power to work over the nitrogen in the soil air and store it up in the form of nitrates which are readily available as plant food. These legumes always do well in arid and semi-arid districts and after having been grown for a few years, they have so increased the nitrates in our soils that we then have a far better soil than our Eastern brother, for we not only have fully as much nitrogen, but a much larger supply of minerals which are so necessary for good crop production.

It has been estimated that the several different plant foods that are necessary for efficient crop growth only furnish 5 per cent. of the amount of the substance of an ordinary plant. The other 95 per cent. is furnished by the air and water. It is very important, however, that those elements that comprise the 5 per cent. must be in the soil if maximum crop production is to be secured. If the soil is lacking in any one of these elements, little or no crop will be produced. We must see to it therefore that our soil remains fertile and that we maintain in it a sufficient supply of these plant foods.

Looking at crop production from another angle, we find that there are six essential factors in the growing of crops. These are seed, seed bed or home for the plant, plant food, moisture, heat and light. It is very gratifying that we can control a surprisingly large number of these factors in a good irrigated district.. If we are good farmers and know our business, we never plant seed without first assuring ourselves that it has good germination. We thus have control over this factor. We can also control the seed bed, for the good farmer always works it until it becomes a satisfactory home for the plant. The third factor, that of plant food, can also largely be controlled, as I hope to explain later in the discussion. This is also especially true of the fourth factor, that of moisture, under a good irrigation ditch. The inability to control this factor has caused the dry farmers of the prairie Provinces more loss of crop than the combined deficiency of all the other factors mentioned. In an arid or semi-arid District where irrigation is necessary and desirable, too much rain is never experienced. The irrigation farmer therefore has this factor absolutely under his control. The last two factors, those of heat and light, are the most difficult to exert any control over of all, but with our dry arid climate we do not need much control over them as we almost always have heat and light enough to grow a bumper crop.

I should like to speak at greater length concerning the control of moisture, the fourth factor mentioned. Have you ever stopped to think that the amount of water that should be applied to different crops in order to secure maximum returns varies greatly? If you will consider for a moment the difference in the habit of growth of alfalfa, pastures and other luxuriant growing forages on the one hand and potatoes, other root crops and the cereals on the other, this can readily be seen. I spent several years working under the direction of our friend, Dr. Fortier, who will address us during the Convention, during which time I had the opportunity of making an intimate study of the water requirements of crops. We found that in order to secure maxi-

mum crops of alfalfa, twice as much irrigation water was required as for a maximum crop of wheat; that if an amount sufficient to make a maximum crop of alfalfa were applied to the cereals, the yield would be much decreased, also that the same difference in the water requirements largely applies to other crops, such as potatoes, garden stuff, fruit and pasture grasses. All of the different crops need different amounts of water in order to produce maximum returns.

It is therefore apparent that the irrigation farmers can grow larger crops with irrigation than anyone can possibly grow under humid conditions where the moisture is secured from rainfall. A good many dry farmers will not admit that the irrigator could excel him in yields if he could have the exact amount of rainfall he desired and no more. But such is the case, for the maximum possible returns cannot be secured from a variety of crops where they are all receiving the same amount of water. The irrigator therefore can always produce larger crops than his dry farmer neighbor but in order to do so, the irrigator must carefully understand his business. It will readily be seen that the successful irrigation farmer has much more to learn than his dry farmer neighbor. He must know fully as much about livestock, pests, seed, preparation of seed bed and how and when to plant as the dry farmer, but if he is to secure the full advantage from his irrigation ditch he must in addition know all about irrigation and when, how much and how to apply the irrigation water.

There is no doubt but that the maintenance of plant food in the soil is less appreciated and more neglected than even the study of irrigation or the application of water. Some men plant wheat year after year on the same land without fertilization or crop rotation of any kind and then wonder why the yield decreases. They do not seem to realize that the store of plant food can be exhausted by continually cropping to the same crop. Sooner or later these men must begin to appreciate the value and advantage of crop rotation and the sooner the better.

In cases where crop rotation is not practiced the usual reason for the decreasing yield is the depletion of the available store of nitrogen. It is safe to say that this is more often the cause of low yields than almost any other factor. Crop rotation takes care of this problem, as by introducing a legume into the rotation, the nitrogen supply is replenished. The experimental stations of Alberta have discovered after years of trial that one can expect a greatly increased yield of a large number of crops following a legume such as alfalfa or peas. Our experience in the Brooks-Bassano Districts shows that the growing of field peas for only one year increases the yield of the succeeding crop of wheat to the extent of approximately ten bushels per acre. Many cases are on record where wheat yields grown on three or four year old alfalfa sod are double those produced from adjoining fields that have never grown legumes or been fertilized in any way. The sooner we begin to realize and appreciate the advantages of crop rotation the better.

The question is often asked, "what shall we do with the crops that we rotate with our wheat and other grains for the purpose of keeping up soil fertility. Is there a market for them, or must we dispose of them at a loss?" I propose to demonstrate to you that these crops not only increase the yield and profit secured from the wheat and other grains, but that they themselves even at the present time are far more profitable than wheat.

Field peas work in well with the wheat as a rotation, planting wheat one year and peas the next. The peas that have so far been grown in our District have never produced the record yields that have been secured by our friends—The Canada Land and Irrigation Company, on their Ronolane demonstration farm—though 40 bushels per acre on fair sized areas has not been uncommon. The entire crop from the Brooks and Rosemary Canadian Pacific Railway demonstration farms was sold last year for from $4.00 to $5.00 per bushel, which with yields of from 25 to 40 bushels per acre gave us gross returns of from $100.00 to $200.00 per acre. These results certainly compare favorably with those secured from wheat.

Alfalfa will without doubt prove to be the main leguminous crop for rotation purpose in this Province. Where this crop is used, it should be left for from three to four years before plowing it up. It is not wished to infer that it requires three years for the alfalfa to put the same amount of fertility into the soil as peas, but if profit is to be made from the alfalfa itself, it should be left that long as there is no return from it whatever the first year planted. Alfalfa 5 years, wheat 2 years, potatoes one year, oats one year followed by alfalfa again for five years would be another good rotation. I do not believe in fixing any iron clad rotation however but do wish to impress upon you the following point and that is that the grain and root crops must be rotated or alternated with some legume if the fertility and productive capacity is to be maintained. As to the profit that may be made from the growing of alfalfa there is no question but that over a series of years the net returns from it will equal that of any grain crop, even leaving out of consideration the improvement made to the soil's fertility by the alfalfa.

Thirty acres of alfalfa on the Brooks demonstration farm last year made an average yield, baled weight, of 3½ tons per acre. It was all sold at from $25.00 to $30.00 per ton and the approximate profit made from it is easily calculated. The yields of alfalfa during present season (1919) bid fair to excel those of the past year and the price is bound to be fully as high if not higher. We have many cases on record in our district in either of the past two seasons where the net profits received from alfalfa hay have more than paid for the land and improvements upon which it was grown.

Since locating in Alberta, it has been my privilege to make an intimate study of the seed growing possibilities of the district and I am now firmly convinced that we have already demonstrated Alberta's adaptability to the growing of many different kinds of seeds and that for many years to come this will be the most profitable method of marketing our leguminous crops.

During the season of 1918 a single acre of Grimm alfalfa, the seed of which was secured from our friends the Canada Land and Irrigation Company, on the Brooks demonstration farm produced a yield of 15 bushels of marketable seed. This seed was retailed at a comparatively small price (50 cents per pound) for genuine Grimm alfalfa seed, yet the acre made a gross return of $450.00. This same acre again bids fair to produce a most excellent yield of seed during the present season. Other yields of alfalfa that showed a large net profit have also been made in this district.

The results secured from peas have already been mentioned. Field peas do as well here as in any district they were ever grown in and it is my prediction that the next few years will see a large amount of money made from growing of this crop in this Province. Some of the most striking results that have been secured however are those from red, white, alsike and sweet clover seed. White Dutch clover seed retailed during the past Spring for 80 cents per pound, yet we have already made several yields on different farms of a most excellent quality that have ranged from 150 to as high as 330 pounds per acre. This, even with a price of 60 cents per pound gives gross returns of from $90.00 to nearly $200.00 per acre. So far we have always produced a satisfactory crop of this and the other clovers every time we have left an area for seed. At Tilley during 1917 a 3.5 acre area produced 12 1-2 bushels per acre of an excellent grade of alsike clover seed. The smallest yield we have ever made of this clover has been six bushels per acre and the quality has always been good. This seed normally retails at from 30 to 50 cents per pound.

Common red clover has been found to winter kill badly with us but we have been fortunate enough to secure a strain of Mammouth red clover that has thus far proved hardy. This clover has made yields of seed of an excellent quality ranging from three to as high as eight bushels per acre. White and yellow sweet clover were saved for seed for the first time during 1918. These made yields of 16 and 10 bushels per acre respectively. I could occupy my entire time in the discussion of the production of the clover seeds and the profits that may be made and I firmly believe will be, made from growing them. I am very familiar with the clover seed industry in the famous Twin Falls, District of Idaho, where I have seen the industry grown from nothing until now the one irrigation project alone is producing $1,000,000 worth of this seed per annum. So far as our present investigations have progressed, we can see of no reason why the Alberta irrigated Districts will not prove fully as well adapted to the production of these leguminous seeds as the Districts above mentioned. There is no doubt therefore but that crop rotation in Alberta will prove profitable.

A discussion of profitable irrigation crops would be incomplete without some mention of potatoes. On the 31st of July at Brooks this year we started digging a two-acre area of Early Ohio potatoes that were planted very early on well fertilized land. On July 31st, one-quarter acre of these were dug

and sold to the Brooks' merchants at wholesale in competition with potatoes from outside Districts. The one-quarter acre gave us a gross return of $105.00, at the rate of $420.00 per acre. We have made similar results during other years. On the 12th of August, 1917, potatoes from an adjoining area to the one above mentioned were giving us a return at the rate of $720.00 per acre. We feel sure that the growing of a limited area of early potatoes in the Brooks-Medicine Hat District will prove to be a very profitable industry. By careful attention to the planting and marketing of the crop and the maintenance of the soil's fertility, early potatoes can be placed on the market from this district from one to three weeks before the main crop of Alberta potatoes are ready for market.

A very great advantage of crop rotation that as yet has not been mentioned is the fact that it is the best means for keeping down weeds and the eradication of pests. Even clover seed crops will become so weedy that the seed cannot be marketed readily if the land is left too long in one crop. Where wheat is grown year after year the land also becomes very weedy. Fungus disease and crop pests that prey upon some particular crop also have an excellent chance to mulitply unless crop rotation is practiced.

Time will not permit a more lengthy discussion of this subject that to me is a most interesting one. In closing I wish to emphasize a few of the main points that have been touched upon. These are briefly:

First: That semi-arid soils are poorer in nitrogen but richer in mineral plant foods than those of the humid Districts.

Second: That the deficiency of nitrogen of these soils must be supplied by fertilization or the growing of legumes and that the latter is the best and cheapest method of supplying it.

Third: That no two crops can produce maximum returns under rainfall or with the same amount of irrigation water and that the irrigation farmer is the only one who can supply different amounts to different crops and thus produce maximum yields.

Fourth: That the irrigation farmer in order to make the most from his land must be a better student than the dry farmer.

Fifth: That crop rotation must be practiced in any district and particularly in this district.

Sixth: That leguminous crops such as alfalfa, peas and the clovers must be used in the rotation and that they they will without a doubt prove to be in themselves far more profitable than the cereals.

Seventh: That you must rotate and keep rotating and that the more you rotate the more money you will make and the more satisfied you will be. (Applause).

You can take a little plot, of course, and flush it over real quick, but you cannot do it in ordinary practice.

DELEGATE: Have you had any experience with corn?

MR. BARK: Not very much. Since becoming an irrigator some 15 or 16 years ago, I have never lived in a well developed corn section, but I have grown a little, but not a great deal. Corn does not take, in my opinion, very much water, but when it needs it, it needs it bad and that is about the time the ears are forming. I can remember as a boy when father would be anxious about it raining just about the time the ears were coming on and if we got one soaking, then we could always get a good yield. We irrigators are relieved from that because we have the soaking at our finger tips any time we want to put it on.

DELEGATE: How much do you plant to the acre of alfalfa?

MR. BARK: Since coming to Alberta I have listened to men who know more about alfalfa than I do and they say to plant 15 pounds to the acre and I have planted a good many thousand of acres in alfalfa and have no reason to doubt that the use of this amount is good practice. That is Mr. Fairfield's judgment as to the amount required. In Idaho it seems to me we got good stands from sowing ten to twelve pounds to the acre, but our winters are more rigorous and the climate more erratic and our land not so well irrigated. Remember, 10 pounds to the acre puts 52 seeds on every square foot of the acre, and if it all grew it would be as thick as hair on a dog's back. If you were planting corn and 50 per cent. did not grow, you would not have a crop at all. If you handle the alfalfa properly 15 pounds would be ample.

DELEGATE: Is inoculation necessary here?

MR. BARK: Inoculation is absolutely necessary in Alberta. In Idaho and Wyoming it was unnecessary. It would not hurt anything, but it would do no good. This inoculation stunt is quite a lengthy problem, but I will say this, there is a little bug, or germ, or bacteria if you like, which if it is in the soil where you plant your alfalfa, renders inoculation unnecessary. Apparently that bacteria is in the soil down south, but they are not in very much of our soil here and alfalfa and other legumes will not do well unless they have these bacteria on their roots.

Generally speaking, you want to put a different kind of bacteria on each different legume. There are exceptions, but I cannot give them all to you. For instance, alfalfa and sweet clover will have the same and red and alsike will have the same, but peas and beans and vetch have different ones. I think I can give a little bit of information about inoculation that would be worth spending a minute on. When I first came to Alberta this inoculation was new to me. I was up in Strathmore and saw farmers coming in to draw away the alfalfa soil which had been sent there from the demonstration farm. This was an expensive arrangement. It had to be shipped on freight cars

and then the farmers would come in for miles to haul it out to their farms. Now, however, they have the culture method. You send to the school at Claresholm or Edmonton and they send you a bottle containing the proper culture. You put sugar and water in the bottle with the culture and mix it with a bushel of seed. Let it dry out a little and you have the bacteria on each seed.

At the University of Illinois I learned a new and cheaper method that might help us. The chief Bacteriologist of that station has been inoculating by the Glue method. In the past we have either had to send to the provincial laboratory at Edmonton or Claresholm to get culture or else haul heavy loads of inoculated soil from a neighbor's field. But the Chief Bacteriologist, and he is the man in the state of Illinois who would make the culture if it were made, will not make it at all because he says there is a lot of danger of the bacteria being killed or spoiled before being used. He sends out a quart of inoculated soil for each bushel of seed a man wants to plant, whether it is field peas, beans, alfalfa or clover, together with instructions. These are as follows: Put six ounces of furniture glue in a gallon of water and dissolve it. Then sprinkle it over a bushel of seed and mix or stir until dry. As it starts to dry, take the one quart of inoculated soil from the alfalfa, clover, pea or bean field, and mix with the seed as it dries and theoretically you have one grain of soil stuck to each seed, after which you plant within 24 hours in the regular way. This method has been found to develop modules on the alfalfa roots in seven days after planting and is as nearly fool proof as it is possible to make anything. We have been using the method and it is one of the best and cheapest that I know. (Applause).